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# JOSEPH HORACE FAULL, 1870–1961

ANNA F. FAULL

*With portrait* *

JOSEPH HORACE FAULL was born in L'Anse, Michigan, on May 3, 1870, the eldest son of James and Catherine (Bennetts) Faull. He died June 30, 1961, at his home in Cambridge, Massachusetts, Professor of Forest Pathology, *Emeritus*, at the Arnold Arboretum, Harvard University. His studies of plant pathogens had led him from the Arctic Circle to the Tropics in North America, filled his classrooms with students, and won for him world-wide recognition as an authority on forest diseases and in particular the rust fungi.

His early life and training can be summarized quickly. Born in the pine forests of Michigan, he grew up as a minister's son on the nothern shore of Lake Ontario. Here he often drove long distances through the farm and forest lands with his father talking about Charles Darwin whose theories on evolution James Faull was inclined to accept. He began to teach before finishing high school, interspersing study with teaching until he had earned three Normal School certificates and the first degree in Arts from the University of Toronto, where he had enrolled at Victoria College with the class of 1898. From 1898 to 1900, he taught mathematics in Belleville, Ontario, at Albert College, where he had completed his preparation for the University some years earlier.

He married Annie Bell Sargent, of Bellwood, Pennsylvania, late in 1903. They had met during the summer in Cold Spring Harbor, Long Island, New York, where he replaced Albert F. Blakeslee as assistant to Dr. Duncan S. Johnson, of Johns Hopkins University in the summer botany course. Miss Sargent, as a candidate for the doctorate, was studying life-histories of spiders. She had obtained her A.B. degree from the University of Pennsylvania, as one of the first small group of young women ever to be admitted to the regular courses of study at that institution. Together until her death in 1953, she shared with him an unabated interest in natural history, as well as a great love for students and all children. Of their own three, Cath-

* This portrait was taken by J. Horace Faull, Jr., in 1949 at the Pathological Laboratory of the Arnold Arboretum, Jamaica Plain, Boston, Massachusetts.

erine Sargent died at the age of sixteen, an invalid following an attack of influenza in early infancy; Anna Forward followed her father into botany; while J. Horace, Jr., has made a name for himself in chemistry.

Dr. Faull's career in botany began in 1900 when he returned to the University of Toronto to study with Edward Charles Jeffrey, Lecturer in Biology, whose sectioning of lignites (coal), along with the application of Darwin's theory of evolution to research on the anatomy of woody plants, was already attracting attention. Mr. Faull's problem was the vascular structure of the *Osmunda* ferns. His first paper was published by the *Botanical Gazette* in 1901. More important, Dr. Jeffrey told him about William Gilson Farlow and Roland Thaxter at Harvard, the two American pioneers in the new field of mycology.

Mr. Faull went to Harvard in 1901–1903 as an Austin Fellow to begin under Professor Thaxter the studies on the cytology of the Ascomycetes which were to be the major subject of his published research until 1913. His papers on the formation of the ascus and its spores are still standard references in this field. In 1904, he received his doctorate from Harvard.

In 1903, Dr. Faull had already accepted a lectureship in botany at the University of Toronto, the same lectureship (under a changed name) left vacant by Dr. Jeffrey's appointment to Harvard. He remained with his wife and family in Toronto until 1928, with sabbatical leave in 1909–1910 for a brief visit to Harvard and a year's study abroad, mostly with Robert Hartig at the Forst Botanische Institut of the University of Munich, Germany. Botanically he found the trip abroad somewhat disappointing, although he profited in prestige, in an increased facility with the German language, and in a deepened interest in forest pathology. He had been made an associate professor at Toronto in 1907. In 1918, this was changed to a full professorship while he continued as head of the department which he had created. Before he left, his department taught students in the general (liberal) arts, applied science, household science, pharmacy, and forestry; his classrooms were crowded; his graduate students and assistant staff were increasing in numbers, and a new building for botany alone was being proposed in the Provincial Parliament.

Summers at the University, with an early closing date in April or May, were long and, for Professor Faull, varied. He continued his research with publications on the Ascomycetes and other fungi, a natural history of the Toronto region and a paper on Charles Darwin. He built a large collection of lantern slides, photographs, and preserved material for teaching. He attended courses in forestry at the College of Forestry, Syracuse University, New York. He taught in the summer schools at Cornell University, Ithaca, New York (1915–17), and at Harvard (1925). He also taught his own students in Toronto. He collected in the Adirondacks with G. F. Atkinson, in the Allegheny Mountains of Pennsylvania with his wife (1913–1917), in the country a few miles or more from his Toronto home, and in the forest lands of Ontario and Quebec (Timagami, Algonquin Park, the Rideau Lakes, Georgian Bay, the Laurentians). Wherever he went he collected fungi and pathological specimens. These impressive

collections of teaching, research, and reference material are one of his legacies to botany.

Apart from the University and at the request of the Canadian Government, Dr. Faull established a department of forest pathology with a field laboratory in the coniferous forests on Bear Island in the Lake Timagami Forest Reservation of Ontario. Commencing in 1918, much of his summer time was spent in the development of this laboratory, in long-range experiments there, and with one of his students, Wade Watson, in the compilation of a check list of the Timagami flora. At the same time his services as a consultant were in increasing demand by lumber companies and others with forest or tree problems. These requests, although remunerative, were to him often annoying interruptions to his major interests at the University and in the field laboratory. When he left, the Government laboratory and department, as well as a shade-tree laboratory, were as firmly established as the department at the University, while his students were beginning to appear as responsible men and women in botany and forestry in the universities, schools, and government laboratories and departments throughout the Dominion. He had indeed earned the citation of "Father of Canadian Botany" given him in 1959 at Montreal in the opening address at the IX International Botanical Congress.

In 1928, he came to Harvard University as Professor of Forest Pathology to take part in the expanding program of research envisioned by Charles Sprague Sargent and Oakes Ames for the Arnold Arboretum. For Professor Faull this meant freedom from the increasingly heavy teaching and administrative load at Toronto and a chance to devote most of his time to writing, research, and the advancement of forest pathology. He brought with him his collections of research and reference material, his graduate students and his reputation as a consultant. The Arboretum provided a laboratory and greenhouse built to his specifications on the adjacent Bussey Institution grounds; the Farlow Herbarium gave working space there; and, later, after their completion, the Biological Laboratories provided additional laboratory rooms.

Professor Faull's conception of the new appointment and of forest pathology can best be stated in his own words taken from letters to Edward C. Jeffrey and to Oakes Ames at this time. He wrote: "My mind is set on advancing Forest Pathology — completing and writing up accumulated researches of which there is a good stock in hand, taking up others in mind, organizing the position at the Arboretum on a broad and sound basis and perhaps working towards a treatise of the Hartig type — these are possibilities within reasonable expectation of attainment." Again, "The field is a broad one for it involves the study of the etiology of arboreal diseases and of the principles of their control. As for etiology only a beginning has been made in America; there exists a host of diseases the causes of which are yet unstudied and unknown, and in several instances that come to mind wrongly ascribed. Intelligent control is possible only when causes are known, but even then there are principles to be worked out. This is particularly true of our untamed and abused American forests

where the solution seems to lie along prophylactic lines frequently based on a knowledge, mostly not yet acquired but acquirable, of the relation of the age of the hosts to susceptibility, of the rate of progress of the pathogens and the relative amount of destruction caused. There is likewise a phase in connection with the utilization of immense quantities of waste diseased living timber. All these aspects constitute a vast field within which researches may be undertaken and if you subscribe to these limits your project will be as broadly based as the one in taxonomy which has been so long and so successfully developed."

Scarcely pausing to settle into the new laboratory, Dr. Faull began at once the program that he had laid out for himself: the completion of earlier research, the study of "immediate pathological problems presented by trees in the Arboretum" and "of any or all diseases of all kinds of trees wherever found and whether in plantations or in the forests." The latter was to lead him far afield from one end of the continent to the other, while his days in Cambridge were filled with writing, research, students, and visitors from all over the world. One can trace his collecting and travel in his accessions books.

The first summer found him in Timagami in August checking on the experiments he had last seen in June just before coming to Harvard; returning to old locations at Proulx, Quebec; and extending his range into the Gaspé. A month later he was in Maine examining nursery spruce and white pine for the Brown Company. His first paper appeared in the *Journal of the Arnold Arboretum* in 1929, "A Fungous Disease of Conifers Related to Snow Cover." It was based on the work at Proulx, Quebec, begun some years earlier, and on observations made at the Brown nurseries.

From 1929 to 1933, he continued this program of revisiting old locations and experiments, adding new ones, advising and co-operating in experiments with the lumber companies and others. He also gave the undergraduate half-course in pathology agreed upon. In 1929, he made collections at the Arnold Arboretum; at the Kelsey nurseries, in Boxford; at Oqussoc, in Maine; and again at Proulx, in Quebec, and at Lake Timagami. He extended his trips into Nova Scotia at the request of the Provincial forester where he notes finding "*Milesina polypodophila* (Bell) Faull on *Abies* and *Polypodium* side by side." He repeated the June trips in the fall and again in 1930. He visited the West and the Pacific Coast in 1931, collecting in the Yellowstone National Park, in Wyoming; at the North Priest River Forest Station, in Washington; in Oregon; in California; in Idaho; and in Illinois. He concentrated on the New England mountains in 1932: Vermont, the Presidential Range, the Berkshires. In 1932–1934, the Arboretum published the first of his monographs on rusts, that on *Milesia*.

From 1933 to 1940, Dr. Faull included a winter trip to the tropics in his regular program for the year. In December and January, 1933–34, he visited the mountains of Jamaica, Panama, and the Canal Zone. He returned to Jamaica in February and March, 1935, and again in 1935–36, after a three week stop in Cuba. He wrote in the records of the Harvard Botanical Garden at "Soledad," near Cienfuegos, Cuba: "Arrived Dec.

17, 1935. Departed Jan. 5, 1936. Activities: 1) Made a pathological reconnaissance of the Arboretum and of the forest tree plantations at and near Soledad. 2) Examined critically a disease of Marabu [*Dichrostachys cinerea*] between Soledad and San Blas, a disease of *Ficus* in Soledad and several heart rot diseases of trees; assembled some relevant material. 3) Collected Pucciniastreae in the Trinidad Mts." The following winter he went to Guatemala where, in addition to rusts, he collected material of an *Abies* growing at 10,000 feet which Rehder later described as *A. guatemalensis*. In November, 1937, he was in Mexico with Professor Maximino Martínez collecting in the remote areas of the states of Michoacán, Mexico, Morelos, Hidalgo, Veracruz, and Chiapas, as well as in the Federal District. He returned to Mexico in 1938 to visit Oaxaca and in 1939 to collect again in Chiapas and Hidalgo, as well as in the northern states of Chihuahua and Durango. In the meantime, his summer trips continued: the Gaspé, Maine, New Brunswick, Long Island, and Chicago, in 1933; Quebec, Mt. Washington and Maine, in 1934; Maine and Metis, Quebec, in 1936; Vermont, Maine, and Long Island, in 1937; Vermont and Connecticut, in 1938; New Hampshire, in 1939; Massachusetts every year.

In 1938, the Arboretum published the second of his monographs on rusts, that on *Uredinopsis*. Actually, this was the third of his long papers on the rust fungi dealing with the taxonomy, morphology, physiology, host relations, etc., which he considered not only knowledge of general botanical interest but basic for control of plant diseases specifically or in principle. In 1926, two years before his Harvard appointment, he had presented a long paper on the Puccineastreae at the International Congress of Plant Sciences, Ithaca, New York. While not themselves "treatises of the Hartig type" contemplated in his letter to Dr. Jeffrey, they undoubtedly were working towards it. One more monograph was intended but never written, although he had collected the material and begun the necessary studies. Like all of his work, these papers are the scholarly presentations of careful study and experiment in field and laboratory by a man with a capacity for detail combined with breadth of vision and a keen insight.

Simultaneously with the field work, Dr. Faull organized the laboratory at the Arboretum. By September, 1928, the small building was ready with its own library "of several thousand pamphlets," periodicals, and reference books; the important collections of diseased plants (about 1000 specimens); and the usual apparatus for work with cultures and microscope. Addition of the experimental greenhouse in 1929 or 1930 completed the small laboratory, while more space for students was provided as needed at the nearby Bussey Institution, at the Farlow Herbarium in Cambridge, and, later, in the new Biological Laboratories there. On July 1, 1929, Dr. Faull reported on a reconnaissance of the living collections of the Arboretum, in addition to five major projects under active investigation by himself, his assistant (G. D. Darker, from Toronto), and the first of his Harvard graduate students: (1) rusts of fir and spruce, (2) *Phacidium* blight and snow cover, (3) lilac disease, (4) needle-cast diseases of conifers, (5) browning of white-pine transplants. The first two were a continuation of

work begun at Toronto, in the Timagami forests, and at Proulx, Quebec. The last two came from field work with lumber companies in Maine or from general collecting. The lilac was an Arboretum problem.

By 1931, the pathological laboratory envisioned by Oakes Ames and Dr. Faull and established in fulfilment of "the expressed wish of the late Director, Charles Sprague Sargent, and as part of Dr. Sargent's conception of the Arboretum as an institution for the study of woody plants in all fundamental aspects" was in full swing with the functions of the laboratory defined "as comprising interest in the Arboretum's living collections, extension services, instruction and research." With the propagating houses next door and the living collections of the Arboretum itself within hand's reach it was ideally located both for his own researches and for friendly co-operation with the rest of the Arboretum group. Contact with the undergraduate College was maintained through the half-course in plant pathogens, while graduate students, postgraduates, and scholars continued to come in twos and threes and sevens. The United States and foreign governments from Canada to Jamaica, estate owners, forest interests, and others called with increasing frequency for extension services. This, in turn, offered not only new problems but often supplementary financial support for their study and for the postgraduate work which Dr. Faull encouraged his students to do both in his own laboratory and abroad.

For the next ten years the laboratory continued to operate under Dr. Faull's direction with the same efficiency and devotion. The problems brought in by field work, collecting trips, extension services, and the Arboretum itself were numerous and specific. Many of them were quickly answered. But many involved much broader botanical issues: "the host of unknown and unstudied" causes of plant disease; "the principles of control yet to be worked out"; the relationships of host, parasite, and environment; morphology; anatomy; physiology; and even some aspects of genetics — in short, the entire range of botanical science. At least twenty-two such studies were carried through to the publication of significant conclusions, a broadly based beginning in the "vast field" of unstudied arboreal pathology for which the laboratory had been organized. Of most popular interest is the Dutch elm disease, which Dr. Christina Buisman, of Holland, found for the first time in the United States at the end of a year's work (1929–30) on American elm-diseases. Early hope of eradication faded when some years after its elimination from Ohio it reappeared in New Jersey; thereafter, the Arboretum effort was directed at control. Equally or more important both botanically and practically were other studies: a disease of *Fagus*, lilac blight (a graft incompatibility leading to work on viruses), taxonomy of *Ganoderma* (initially a question of classification), morphology of rust spermogonia as taxonomic criteria, mycorrhiza (morphology and physiology involving mineral nutrition of pine), wilt diseases of elm (other than Dutch), etc. The record of the laboratory can be traced in the annual reports and papers published in the Arboretum's *Journal* or as one of its *Contributions*, a series inaugurated by two papers from the pathology laboratory: Dr. Darker's Ph.D. thesis on

needle-cast fungi and Professor Faull's monograph on "*Milesia*." That the laboratory was not continued and his position remained unfilled after his retirement was a disappointment to him.

Professor Faull retired in 1940, a world figure in forest pathology and the world's authority on rust fungi associated with ferns. His students have gone on to make names for themselves in the botanical world and to serve in responsible teaching, administrative, and research positions both in the United States and Canada. The extension services have been taken over mostly by government agencies, but the broad and comprehensive kind of research begun at the Arboretum seems not to have been continued in this country.

For several years, Dr. Faull himself remained in his laboratory, assisting with Arboretum affairs, helping in the fight against Dutch elm disease, serving as an associate editor of the *Journal*, organizing his collections, advising at the Farlow Herbarium, and welcoming the scientists who came to see him. The visits of two of these gave him particular satisfaction. One was that of Professor Maximino Martínez, of Mexico, who had arranged for his earlier collecting in the Mexican forests and had accompanied him on some of the trips. The other was Dr. Krishnadas Bagchee, from the Forest Service in India, who shared Dr. Faull's love of the forests and his interest in fungi. Dr. Bagchee brought with him a collection of Indian rusts to my father's delight. In 1956, the *Journal of the Arnold Arboretum* published his last paper. Shortly thereafter, Dr. Faull gave up his last small room in the Cambridge laboratories.

The proper disposal of his large collections of pathological material occupied much of his time in these later years. Some, of course, had been left at the University in Toronto. But the thousand specimens brought with him to Harvard had grown through exchange, communication, and his own collecting trips and field work and that of his students and associates to nearly fourteen thousand. The small room where the earlier collections had at first been kept had become inadequate long before his retirement. In 1939, he had placed a thousand duplicates of wood destroying fungi in the Farlow Herbarium and three hundred in the Bureau of Plant Industry in Washington (later transferred to the National Herbarium). In 1940, he noted in his report the deposition of his large collection of polypores at the Farlow Herbarium. Finally before his death, he placed a collection of fern rusts (type specimens and material documenting his publications) in the U.S. National Herbarium, where he hoped it would be both adequately cared for and available for reference and future investigations. The large remainder of the collections with duplicates has been placed in temporary storage at the Farlow Herbarium and the Arnold Arboretum awaiting more permanent quarters. A few are still at his home in Cambridge.

As his health failed, Dr. Faull spent more and more of his time with his family, partly in Texas, but most of it at their home in Cambridge. Here he enjoyed his garden, his neighbors, a little carpentry, a great deal of reading, a little cribbage, and a voluminous correspondence with friends and students dating back to those whom he had taught as little children in

the Canadian rural schools. As a student at Toronto, he had been the gold medalist in his graduating class of 1898. Now he reread the entire works of Dickens and Shakespeare, along with his other books. As a young man, too, he had played ice hockey on the Victoria College team. Now he listened to the sports broadcasts on the radio. He never lost his interest in the schools or in the education of women or his sympathy for the underprivileged. At his death, a volume of Dickens was near his chair by the radio along with a copy of the Cambridge School Report, a box of fern rusts near his desk.

As a teacher and a scientist, Joseph Horace Faull enriched the two countries in which he lived. His students continue to do so.

Professor Faull had been a member of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, the American Phytopathological Society, the American Society of Naturalists, the Mycological Society of America, the National Agricultural Chemicals Association, the New England Botanical Club, the Royal Canadian Institute, the Royal Society of Canada, the Society of American Foresters, the Society of the Sigma Xi, and the Sociedad Botánica de México.

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